

### **AMENDMENTS TO THE CLAIMS**

Please find below a listing of claims that will replace all prior versions, and listings, of claims in the present patent application:

1. (*currently amended*) A multi-wavelength laser source comprising:
  - a) an input for receiving an energy signal;
  - b) a gain section in communication with said input, said gain section including a homogeneously broadened gain medium having a superstructure grating, said superstructure grating forming a plurality of cavities that are distributed in said homogeneously broadened gain medium such that different resonant wavelengths resonate in respective ones of said cavities when the energy signal is applied to said gain section, at least two of said cavities being separated from one another, said gain section generating a multi-wavelength laser signal when the energy signal is applied to the gain section; and
  - c) an output for emitting the multi-wavelength laser signal.
2. (*original*) A multi-wavelength laser source as defined in claim 1, wherein the energy signal is generated by either one of a pump laser diode, a fiber laser pump, a solid state laser pump and a raman laser pumps.
3. (*original*) A multi-wavelength laser source as defined in claim 1, wherein the gain section further comprises an amplifying section.
4. (*withdrawn*) A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating is a continuous grating such as to provide a multi-wavelength laser having substantially equally spaced frequencies.
5. (*withdrawn*) A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating is a discontinuous grating.

6. *(original)* A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating comprises:
  - a) a first grating segment;
  - b) a second grating segment superposed at least in part on said first grating segment.
7. *(original)* A multi-wavelength laser source as defined in claim 6, wherein the first grating segment is a chirped Bragg grating.
8. *(original)* A multi-wavelength laser source as defined in claim 7, wherein the second grating segment is a chirped Bragg grating.
9. *(original)* A multi-wavelength laser source as defined in claim 6, wherein the first grating segment and the second grating segment are substantially similar to one another.
10. *(withdrawn)* A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating comprises a plurality of grating segments, each grating segment in said plurality of grating segments overlapping at least in part at least another grating segment in said plurality of grating segments.
11. *(withdrawn)* A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating comprises a plurality of sequential grating segments, each grating segment being associated to a respective period and phase.
12. *(withdrawn)* A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating includes an index grating structure.
13. *(withdrawn)* A multi-wavelength laser source as defined in claim 1, wherein the superstructure grating has a complex apodization shape in amplitude.

14. (*withdrawn*) A multi-wavelength laser source as defined in claim 13, wherein the superstructure grating has a complex apodization shape in phase.
15. (*original*) A multi-wavelength laser source as defined in claim 1, wherein the gain medium is selected from the set consisting of erbium-doped glass, rare earth doped glasses, crystals, semiconductor materials and doped polymer materials.
16. (*cancelled*)
17. (*previously presented*) A multi-wavelength laser source as defined in claim 1, wherein said gain section includes an optical waveguide.
18. (*original*) A multi-wavelength laser source as defined in claim 17, wherein the optical waveguide includes either one of an optical fiber, a channel waveguide, a planar optical waveguide, a photonic bandgap waveguide and a hollow waveguide.
19. (*original*) A multi-wavelength laser source as defined in claim 17, wherein said optical waveguide includes a waveguide core and a waveguide cladding.
20. (*original*) A multi-wavelength laser source as defined in claim 19, wherein the superstructure grating is located in the waveguide core.
21. (*original*) A multi-wavelength laser source as defined in claim 19, wherein the superstructure grating is located in the waveguide cladding.
22. (*currently amended*) A method suitable for generating a multi-wavelength laser signal, said method comprising:
- a) receiving an energy signal;
  - b) providing a gain section including a homogeneously broadened gain medium having a superstructure grating, said superstructure grating forming a plurality of cavities that are distributed in said homogeneously broadened gain medium such that

different resonant wavelengths resonate in respective ones of said cavities when the energy signal is applied to said gain section, at least two of said cavities being separated from one another; and

- c) applying the energy signal to said gain section to generate a multi-wavelength laser signal.

23. (*withdrawn*) A method for manufacturing a multi-wavelength laser source, said method comprising:

- a) providing a gain section;
- b) applying a superstructure grating to at least a portion of said gain section, the superstructure grating forming a distributed Fabry-Perot-like structure;
- c) positioning said gain section in communication with a pump laser unit, the pump laser unit being adapted for generating an energy signal adapted for causing said gain section to generate a multi-wavelength laser signal.

24. (*withdrawn*) A method as defined in claim 23, wherein applying a superstructure grating to at least a portion of said gain section comprises exposing at least a portion of said gain section to UV radiation in order to induce the superstructure grating.

25. (*withdrawn*) A method as defined in claim 23, wherein applying a grating to at least a portion of said gain section comprises using lithographic techniques to induce the superstructure grating.

26. (*withdrawn*) A method as defined in claim 23, wherein applying a superstructure grating to at least a portion of said gain section comprises:

- a) applying a first grating to a first segment of said gain section;
- b) applying a second grating to a second segment of said gain section, said first segment and said second segment overlapping at least in part with one another.

27. (*withdrawn*) A method as defined in claim 26, wherein the first grating and the second grating are substantially similar to one another.

28. *(original)* An optical transmitter apparatus comprising the multi-wavelength laser source described in claim 1.
29. *(original)* A device suitable for providing optical components characterization comprising the multi-wavelength laser source described in claim 1.
30. *(original)* A device suitable for providing temporal spectroscopy functionality comprising the multi-wavelength laser source described in claim 1.
31. *(original)* A device suitable for providing material characterization for non-linear effects comprising the multi-wavelength laser source described in claim 1.
32. *(currently amended)* A multi-wavelength laser source comprising:
- a) a pump laser unit adapted for generating an energy signal;
  - b) a gain section including a homogeneously broadened gain medium having a superstructure grating, said superstructure grating forming a plurality of cavities that are distributed in said homogeneously broadened gain medium such that different resonant wavelengths resonate in respective ones of said cavities when the energy signal is applied to said gain section, at least two of said cavities being separated from one another, the pump laser unit being adapted for applying the energy signal to said gain section to cause a multi-wavelength laser signal to be generated; and
  - c) an output for emitting the multi-wavelength laser signal.
33. *(original)* A multi-wavelength laser source as defined in claim 32, wherein the pump laser unit is positioned such as to generate the energy signal in a co-propagation relationship with the output.
34. *(original)* A multi-wavelength laser source as defined in claim 32, wherein the pump laser unit is positioned such as to generate the energy signal in a counter-propagation relationship with the output.

35. (*withdrawn*) A multi-wavelength laser source as defined in claim 32, comprising a set of pump laser units in communication with the laser cavity.
36. (*withdrawn*) A multi-wavelength laser source as defined in claim 35, wherein each pump in the set of pumps is associated to a respective wavelength.
37. (*original*) A multi-wavelength laser source as defined in claim 32, wherein said gain section comprises an amplification section.
38. (*cancelled*)
39. (*currently amended*) A multi-wavelength laser source as defined in ~~claim 38~~ claim 1, wherein the multi-wavelength laser signal is characterized by at least 8 laser wavelengths.
40. (*previously presented*) A multi-wavelength laser source as defined in claim 39, wherein the multi-wavelength laser signal is characterized by at least 15 laser wavelengths.
41. (*cancelled*)
42. (*cancelled*)
43. (*cancelled*)
44. (*currently amended*) A method as defined in ~~claim 43~~ claim 22, wherein the multi-wavelength laser signal is characterized by at least 8 laser wavelengths.
45. (*previously presented*) A method as defined in claim 44, wherein the multi-wavelength laser signal is characterized by at least 15 laser wavelengths.
46. (*cancelled*)

47. *(cancelled)*

48. *(cancelled)*

49. *(currently amended)* A multi-wavelength laser source as defined in ~~claim 48~~ claim 32, wherein the multi-wavelength laser signal is characterized by at least 8 laser wavelengths.

50. *(previously presented)* A multi-wavelength laser source as defined in claim 49, wherein the multi-wavelength laser signal is characterized by at least 15 laser wavelengths.

51. *(cancelled)*

52. *(cancelled)*

53. *(previously presented)* A multi-wavelength laser source as defined in claim 1, wherein at least five of said cavities are separated from one another.

54. *(previously presented)* A method as defined in claim 22, wherein at least five of said cavities are separated from one another.

55. *(previously presented)* A multi-wavelength laser source as defined in claim 32, wherein at least five of said cavities are separated from one another.

56. *(new)* A multi-wavelength laser source as defined in claim 1, wherein said homogeneously broadened gain medium is a rare-earth-doped gain medium.

57. *(new)* A multi-wavelength laser source as defined in claim 1, wherein each of said cavities has a length in a millimeter order of magnitude.

58. *(new)* A multi-wavelength laser source as defined in claim 1, wherein said homogeneously broadened gain medium has a length, the multi-wavelength laser signal is characterized by a number of laser wavelengths, and a ratio of the number of laser wavelengths to the length of said gain medium is at least 1 laser wavelength per cm of length of said gain medium.
59. *(new)* A method as defined in claim 22, wherein the homogeneously broadened gain medium is a rare-earth-doped gain medium.
60. *(new)* A method as defined in claim 22, wherein each of the cavities has a length in a millimeter order of magnitude.
61. *(new)* A method as defined in claim 22, wherein the homogeneously broadened gain medium has a length, the multi-wavelength laser signal is characterized by a number of laser wavelengths, and a ratio of the number of laser wavelengths to the length of the gain medium is at least 1 laser wavelength per cm of length of the gain medium.
62. *(new)* A multi-wavelength laser source as defined in claim 32, wherein said homogeneously broadened gain medium is a rare-earth-doped gain medium.
63. *(new)* A multi-wavelength laser source as defined in claim 32, wherein each of said cavities has a length in a millimeter order of magnitude.
64. *(new)* A multi-wavelength laser source as defined in claim 32, wherein said homogeneously broadened gain medium has a length, the multi-wavelength laser signal is characterized by a number of laser wavelengths, and a ratio of the number of laser wavelengths to the length of said gain medium is at least 1 laser wavelength per cm of the length of said gain medium.